

## EFFICACY OF INSECTICIDES USED FOR GLASSY-WINGED SHARPSHOOTER CONTROL IN CITRUS

### **Project Leaders:**

Elizabeth E. Grafton-Cardwell

Department of Entomology

University of California

Riverside, CA 92521

(Stationed at the Kearney Agricultural Center)

Craig Kallsen

UC Cooperative Extension

Kern, CA

### **Cooperators:**

Chris Reagan

Department of Entomology

University of California

Riverside, CA

Marjie Bartels

UC Cooperative Extension

Kern, CA

## INTRODUCTION

Glassy-winged sharpshooter (GWSS), *Homalodisca coagulata*, is currently infesting more than 130 square miles of grapes, citrus, and urban landscapes in Kern County. Citrus is a preferred oviposition host for GWSS, thereby acting as a source of adults that move into grapes and potentially vector Pierce's disease (PD). The incidence of PD in Kern County was thought to be very low, however, after 4+ years of heavy GWSS densities in the General Beal Road area, the incidence is beginning to escalate. Kern County grape growers are aggressively treating their vineyards with pesticides and requesting that neighboring citrus growers treat their orchards as well. Research is needed to understand how efficacious citrus insecticides are against GWSS and how these additional treatments will disrupt citrus IPM. While vector control is not the long-term solution to the PD problem, it will be important in the short-term to slow the spread of the disease in Kern County and help delay the advance of GWSS into other agricultural areas of the San Joaquin Valley.

## OBJECTIVE

1. Conduct pesticide trials in commercial citrus in Kern County to determine the efficacy of various registered insecticides against glassy-winged sharpshooter.

## RESULTS AND CONCLUSIONS

A group of 10 citrus orchards in Kern County were periodically surveyed by UC Cooperative Extension personnel for pests and beneficials during 2000 and 2001 as a part of an IPM Demonstration program. The sampling method consisted of using a sweep net in the winter months and conducting a 2-minute visual search in the spring-fall months of 20 trees per orchard. Yellow sticky cards were monitored monthly to measure densities of *Gonatocerus ashmeadi*. Glassy-winged sharpshooter was present in all orchards during early 2000 and so we were able to observe how the standard insecticide practices, as well as sprays targeting GWSS, affected their populations.

Table 1 shows the GWSS egg mass and adults+nymphs counts for 2000. Citrus thrips insecticide treatments are generally applied late April and early May. Blocks 1-8 applied selective insecticides for thrips (Veratran®, Success®, and Agri-Mek®) and these insecticides had little or no effect on GWSS. Blocks 9 and 10 applied broad spectrum carbamate (Carzol®) or pyrethroid (Baythroid®) insecticides for citrus thrips and these treatments were effective against GWSS for one-two months. Treatments of Admire® for GWSS were applied to blocks 1, 4, 7, and 8. The Admire® helped to reduce GWSS throughout the summer months, but began to break down by November when harvest was beginning. Growers that wanted to ship to packinghouses in uninfested areas were forced to treat with Lannate® (blocks 8 and 9) to disinfest their crop. These treatments helped to reduce the winter population of GWSS in those two blocks, however, by the following April the populations of GWSS were increasing again (Table 2). California red scale was treated with either Esteem® (blocks 1, 9, and 10) or Lorsban® (block 8). Neither insecticide was very effective in reducing GWSS.

Table 2 shows the GWSS densities during 2001. Block 1 conducted an aggressive and successful program to eliminate GWSS by treating with Lannate® in April followed by Admire® in May. Blocks 2, 3, 4, 7 and 8 continued to use a very soft pesticide for citrus thrips (Success®, Agri-Mek® or Veratran®) and these insecticides did not reduce GWSS. Blocks 5, 6, 9, and 10 applied broad spectrum pyrethroid insecticides (Baythroid® and Danitol®) for thrips control in May and

these were effective in reducing GWSS initially, but these residues began to break down and GWSS began to increase in July. Block 3 applied Provado® (foliar imidacloprid) for citricola scale control in July and it reduced but did not eliminate GWSS. Sites 6 & 8 used Esteem® for red scale and these insecticides had no effect on GWSS. All sites that applied Admire® (Blocks 1, 4, and 7) were successful in reducing GWSS to very low levels. Block 8 applied Evergreen® (pyrethrin + piperonyl butoxide) for GWSS and only partially reduced the population.

To summarize, the best suppression of GWSS in citrus has been through the use of a foliar broad spectrum pesticide (pyrethroid or carbamate) in the spring to reduce overwintering adults, followed by a systemic Admire® treatment to reduce their numbers in the summer. No treatment program has prevented GWSS from returning to the citrus in the fall and overwintering in that crop. Insecticide treatments applied specifically for in-season or preharvest reduction of GWSS have increased grower applications from an average of 1.4 to 2.0 treatments per orchard in 2000 and an average of 1.7 to 2.4 in 2001. This increase of 0.6-0.7 treatments per orchard of course has a direct economic cost to the citrus grower, but it also has a long-term cost. The insecticides that work well to control GWSS are not compatible with vedalia beetles. Thus, we are likely to see outbreaks of cottony cushion scale develop in Kern County that will then require treatment with additional broad spectrum insecticides such as Malathion and Supracide. This, in turn, will disrupt attempts to control citrus thrips, red scale, and mites with natural enemies. Eventually, GWSS and other pests will develop resistance to these insecticides because of repeated use and we will see outbreaks of other pests. Because of the seriousness of the GWSS as a vector of disease, a number of growers in Kern County have abandoned an excellent IPM program and stepped back onto a pesticide treadmill.

**Table 1. Densities of GWSS in Kern County IPM demonstration orchards – 2000.**

Site	Apr 23	May 7	May 21	Jun 11	Jun 25	Jul 9	Jul 23	Aug 13	Sep 3	Nov 5	Pre- harvest	Dec 17
1	*1/0	4/1	1/4*	0/4	1/0	4/0	0/0	0/0	0/5*	0/9		0/16
2	0/0	0/0	0/0*	0/29	43/28	23/0	8/10	0/38	0/136	0/21		0/24
3	6/0*	1/3	2/0	0/32	49/21	40/5	6/12	6/24	3/12	0/7		0/14
4	0/0**	0/1	0/0	0/9	1/2	1/0	1/0	0/0	0/0	0/1		0/1
5	0/0*	0/0	0/0	0/0	0/3	3/2	21/12	14/1	4/5	0/16		0/30
6	0/0*	0/0	0/0*	0/0	0/0	11/0	4/0	1/0	5/1	0/28		0/12
7	*1/3*	0/3	1/1	0/2	1/0	0/0	1/0	0/0	0/0	0/8		0/5
8	2/3*	0/1*	2/0	0/0	0/0	11/2	9/0	1/0	0/2*	0/10	*	0/0
9	1/0*	3/0	0/0	0/0	2/0*	4/0	7/0	0/0	1/0	0/1	*	0/1
10	0/0*	0/0*	0/0	0/0	0/0	17/9	17/1	16/3	10/32	0/10		0/21

2000 Pesticide Treatments (\* Indicates when treatment occurred)

Site 1: (April 21) Admire® for GWSS, (May 31) Veratran® for citrus thrips, (Sept 29) Esteem®+oil for red scale

Site 2: (May 24) Success® + oil for citrus thrips

Site 3: (May 2) 1/2 Success® and 1/2 Agri-Mek® + oil for citrus thrips

Site 4: (April 25) Admire® for GWSS, (May 4) Success® for citrus thrips and katydid

Site 5: (May 4) Success® + oil for citrus thrips

Site 6: (April 27) Agri-Mek® + oil and (June 7) Veratran® + molasses for citrus thrips

Site 7: (April 19) Admire® for GWSS, (Apr 29) Success® + oil for citrus thrips

Site 8: (Apr 26) Admire® for GWSS, (May 6) Agri-mek® + oil for citrus thrips, (Sept 24) Lorsban® for red scale, Lannate® (Nov) for GWSS

Site 9: (May 1) Baythroid® for citrus thrips, (July 6) Esteem® + oil for red scale, Lannate® (Nov) for GWSS

Site 10: (Apr 27) Carzol® for citrus thrips + Lorsban® for katydid and GWSS and (May 20) Esteem® for California red scale

**Table 2. Densities of GWSS in Kern County IPM demonstration orchards – 2001.**

Adults			Egg masses/Nymphs+Adults									
Site	Jan 15	Feb 19	Apr 2	Apr 23	May 7	May 21	Jun 4	Jun 28	Jul 9	Jul 30	Aug 13	Sep 3
1	5	1	9/0*	10/12	0/0*	0/1	0/0	0/0	0/0	0/0	0/0	0/0
2	17	19	12/4	8/14	2/1*	2/8	3/17	38/33	32/26	*0/0	1/0	2/0
3	5	19	3/2	5/0	5/0*	3/5	2/29	38/44	18/17	7/11	2/17	4/15
4	2	0	0/0	1/0*	3/2**	2/0	1/0	0/0*	1/2	0/0	0/0*	0/0
5	1	0	0/0	1/0*	0/0	0/0	0/0	0/0	0/0	1/0	1/0	5/0
6	0	2	9/0	1/0*	3/2	0/0**	0/0*	0/0	0/1	6/2	3/0	6/0
7	7	5*	0/2	0/0	0/0*	0/0	0/0	0/0	0/0	0/0	0/0	0/0
8	1	0	8/4	18/1	12/2*	5/0*	2/0	1/0	14/7*	20/1	9/1	6/0
9	0	0	2/1	4/0	2/0*	1/0	0/0*	0/0	0/0	2/0	0/0*	5/2
10	0	1	9/0	6/0	1/0*	1/0	0/0	2/0	7/7	6/0	9/2	22/5

2001 Pesticide Treatments (\*Indicates when treatment occurred)

Site 1: Lannate® for GWSS (Apr 8), Admire® for GWSS (May 7)

Site 2: Success® + 0.8% 440 oil (May 16) for thrips and katydid, Provado® (Jul 16) for citricola scale

Site 3: Success® +0.6% oil (May 20) for thrips

Site 4: Veratran® +Molasses for thrips (May 3) + Kryocide® for katydids, 1/2 rate of Admire® for GWSS (May 8), Success® for thrips (May 12), 1/2 rate of Admire® for GWSS (July 6), Esteem® (Aug 24) for red scale

Site 5: Success® + Baythroid® + 1% oil for thrips & katydids (May 4)

Site 6: Success® + Baythroid® + 1% oil for thrips & katydids (May 4), Success® +1% oil (May 23) for thrips, Veratran® + Molasses (Jun 1) for thrips, Esteem® +Latron® B1956 (Jun 11) for California red scale

Site 7: Admire® for GWSS (Mar 29), Success® + .8% oil for thrips (May 4)

Site 8: Agri-Mek® + 1.6% oil for thrips (May 7), Esteem® + Cygon® (May 25) for red scale and thrips, Evergreen® (Jul 23) for GWSS

Site 9: Baythroid® + .5% oil for thrips (May 7), 1/2 block Baythroid® + 1/2 block Success® (June 8), 1/2 block Esteem® (Aug 29) for California red scale

Site 10: Danitol® for thrips, worms, katydid and GWSS (May 15)